(19) Japanese Patent Office (JP)
(12) Publication of Unexamined Patent Application (A)

(11) Unexamined Patent Application No.:	H6-153861
(43) Unexamined Patent Application Date:	June 3, 1994
Request for Examination:	Yes
Number of Claims:	2
Total pages:	5

(51) Int.CL[5]	Identification Symbol	JPO File Number	FI	Technology Display Area
A 23 L 1/305				
1/30			Z	
1/307				

(54) Title of Invention: Fat-reducing Food

(21) Patent Application No.: H4-333575

(22) Patent Application Date: November 18, 1992

(71) Applicant: 391034879
Nissei Kosan Co., Ltd.
657 Hishie, Higashi-Osaka, Osaka

(72) Inventor: Tadashi Fujita
657 Hishie, Higashi-Osaka, Osaka

(74) Agent: Hiroshi Ozeki, Patent attorney

(54) **[Title of Invention]** Weight-Reducing Food

(57) **Abstract**

[Purpose] To provide a weight-reducing food having a remarkably excellent obesity and body weight gain prevention effect.

[Constitution] Weight-reducing food containing branched α-cyclodextrin, γ-linolenic acid, and a peptide having activation functionality.

[Claims]

[Claim 1] A weight-reducing food containing branched α-cyclodextrin, γ-linolenic acid, and a peptide having activation functionality.

[Claim 2] The weight-reducing food described in Claim 1, in which for 100-weight part of the branched α-cyclodextrin, 0.5-10 weight part of γ-linolenic acid and 10-1000 weight part of the above-mentioned peptide are contained.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Application] The present invention is related to a weight-reducing food.

[0002]

[Prior Art] There are three types of cyclodextrin having different molecular structures. More specifically, there are three types of such compounds: α-cyclodextrin, β-cyclodextrin, and γ-cyclodextrin. These cyclodextrin compounds have been used as basic materials for foods for a long time. In particular, β-cyclodextrin has been used for various applications due to its inclusion action. For example, it is used for seasonings, powdery alcohol, etc. However, β-cyclodextrin is digestible and is absorbed from the small intestines in humans, leading to polytrophia. Thus, it is highly unsuitable as a basic material for weight-reducing foods.

[0003] Recently, it has been found that one type of cyclodextrin, α-cyclodextrin, is difficult to be digested by human digesting enzymes, indicating that it can be used as a basic material for weight-reducing foods. Subsequently, it has been further found that α-cyclodextrin specifically adsorbs then excretes free fatty acids in the digestive tract.

[0004] On the other hand, γ-linolenic acid has long been known to be a substance having a lipid

metabolism action. In addition, it is also effective for modulating cholesterol levels and blood pressure, and hence is a preferable substance for maintaining good health.

[0005] Moreover, it has been found that small molecular weight hydrolytes of large molecular weight proteins have multiple biological activities with complicated action mechanisms. Accordingly, peptides with activation functionality have been established.

[0006]

[Purpose and Overview of the Invention] The inventors have for a long time been conducting research on weight-reducing foods. During these studies, it was found that among various compounds effective for obesity prevention, in particular, when α-cyclodextrin and γ-linolenic acid are combined, a remarkably excellent obesity and body weight gain preventing effect can be obtained due to the synergic action of the two compounds, thereby confirming that they are highly suitable as weight-reducing foods. Based on this finding, a patent application was filed, and the patent was granted. Furthermore, in subsequent studies, it has been found that instead of α-cyclodextrin, if a branched α-cyclodextrin is used in combination with γ-linolenic acid and the peptide with activation functionality, the obesity preventing effect can be further significantly enhanced due to the synergic action among the three compounds, thereby accomplishing the present invention.

[0007]

[Constitution of Invention] The weight-reducing food of the present invention contains a branched α-cyclodextrin, γ-linolenic acid, and a peptide having activation functionality, and preferably for 100 weight part of the branched α-cyclodextrin, 0.5-50 weight part of γ-linolenic acid and 10-1000 weight part of the above-mentioned peptide, even more preferably 3-4 weight part of γ-linolenic acid and 400-600 weight part of the above peptide, are used.

[0008] The branched α-cyclodextrin used in the present invention can be any one traditionally known. This branched α-cyclodextrin can be used directly or as a basic material containing this compound. Also, it can be used in combination with a non-branched α-cyclodextrin. In this case, the ratio of the non-branched α-cyclodextrin is preferably 0-45% by weight.

[0009] The γ-linolenic acid used in the present invention can be used directly or as a composition or substance containing this compound, such as evening primrose oil, etc.

[0010] The peptide with activation functionality used in the present invention is obtained by hydrolyzing a polypeptide by a conventional method. The peptide itself is publicly known. Activation means that, by reducing the molecular weight, new properties, which are not seen with the original protein, are added to the original properties of the protein. Functionality means that the various original actions of the peptide are retained as they are. The peptide is preferably one with 7-12 amino acid residues, even more preferably 8-10 residues.

[0011] In the present invention, it is essential to combine all the three compounds. By the synergic action among the three compounds, a remarkably excellent obesity and body weight gain preventing effect can be obtained. In particular, this synergic action is obtained by using 0.5-50 weight part, preferably 3-25 weight part, of γ-linolenic acid and 10-1000 weight part, preferably 400-600 weight part, of the peptide for 100 weight part of the branched α-cyclodextrin. This excellent synergic effect can also be clearly seen from the following experimental example.

[0012] In the present invention, the above three components are contained at the specified blend ratios in various foods and food additives. Alternatively, the two *(sic)* components are molded into various forms such as tablets, pills, granules, etc. along with various known additives, depending on the particular need. There are no special limitations to the food or food additive. A wide variety of them can be used, such as wheat flour, food fiber, soybean powder, etc. The additives for making tablets, pills, granules, etc. can be anything traditionally used in this field, such as lactose, glucose, starch, etc.

[0013] In the following, an experimental example, aimed at further clarifying the synergic effect in the present invention, and practical examples, which represent specific examples of the present invention, are described.

[0014]

[Working Example] Four-week old male rats were divided into 6 groups so that the average body weight was 140 g. In each group, a food prepared with the following blend ratios was fed to 6 rats directly into the stomach once a day at 2.0 g/kg. In addition, an identical commercially available solid-state food was freely available. The average rat body weight of each group was measured after 10 days, 20 days, and 30 days to measure the body weight gain inhibitory effect. Food No. 6 was the control.

[0015]

Food No. 1: branched α-cyclodextrin ..... 50 mg 9%
γ-linolenic acid ..... 0 mg
peptide with activation functionality ..... 0 mg
wheat starch ..... 505 mg

[0016]

Food No. 2: branched α-cyclodextrin ..... 0 mg
γ-linolenic acid ..... 5 mg
peptide with activation functionality ..... 0 mg
wheat starch ..... 550 mg

[0017]

Food No. 3: branched α-cyclodextrin ..... 0 mg
γ-linolenic acid ..... 0 mg
peptide with activation functionality ..... 500 mg
wheat starch ..... 55 mg

[0018]

Food No. 4: branched α-cyclodextrin ..... 50 mg 9%
γ-linolenic acid ..... 5 mg
peptide with activation functionality ..... 500 mg
wheat starch ..... 0 mg

[0019]

Food No. 5: branched α-cyclodextrin ..... 0 mg
γ-linolenic acid ..... 5 mg
peptide with activation functionality ..... 500 mg
wheat starch ..... 0 mg
α-cyclodextrin ..... 50 mg 9%

[0020]

Food No. 6: branched α-cyclodextrin ..... 0 mg
γ-linolenic acid ..... 0 mg

peptide with activation functionality ..... 0 mg

wheat starch ..... 555 mg

[0021] The results are shown in the following Tables 1-3. The numbers in the tables represent g value.

[0022]

[Table 1]

Group No.	Average body weight before start of experiment (g)	Average body weight after 10 days (g)	Average body weight after 20 days (g)	Average body weight after 30 days (g)
1	139.5	181.6	240.4	279.1
2	139.6	180.0	241.1	276.6
3	140.4	169.2	233.0	281.4
4	141.1	140.9	168.3	193.0
5	140.0	146.4	178.5	207.8
6	140.3	194.2	273.0	321.1

[0023] Note, Table 1 shows the changes in average rat body weight for each group (g).

[0024]

[Table 2]

Group No.	Body weight difference before start of experiment (g)	Body weight difference after 10 days (g)	Body weight difference after 20 days (g)	Body weight difference after 30 days (g)
1	−0.8	−12.6	−32.6	−42.0
2	−0.7	−14.2	−31.9	−44.5
3	+0.1	−25.0	−40.0	−39.7
4	−0.2	−53.3	−104.7	−128.1
5	−0.3	−47.8	−94.5	−113.3
6	0	0	0	0

[0025] Note, Table 2 shows the differences in average rat body weight of each group from the control group (g).

[0026]

[Table 3]

Group No.	Chang rate of body weight before start of experiment	Change rat of body weight after 10 days	Change rat of body weight after 20 days	Change rat of body weight after 30 days
1	0.994	0.935	0.881	0.869
2	0.995	0.927	0.883	0.861
3	1.001	0.871	0.853	0.876
4	0.999	0.726	0.616	0.601
5	0. 998	0.754	0.654	0.647
6	1.000	1.000	1.000	1.000

[0027] Note, Table 3 shows the change rate of rat body weight of each group (average body weight of each group / average body weight of control group).

[0028] From the above results it is found that, although in groups No. 1 through No. 3 in which each of the branched α-cyclodextrin, γ-linolenic acid, and peptide with activation functionality was used alone, the body weight decreased as compared with control group (group No. 6), the degree of the decrease was small. By contrast, for group No. 4 in which the three compounds were used together, a large body weight gain reducing effect was observed. After 10 days, 20 days, and 30 days the synergic effect was very clear. In group No. 5 in which α-cyclodextrin but not branched α-cyclodextrin was used, as compared to group No. 4, the body weight gain reducing effect was smaller.

[0029]

[Working Examples]

[0030]

[Working Example 1] Twenty-weight part of branched α-cyclodextrin, 10-weight part of evening primrose oil containing 9 wt% of γ-linolenic acid, and 100-weight part of peptide were mixed with 100-weight part of lactose, thereby producing a weight-reducing food.

[0031]

[Working Example 2] Thirty-weight part of branched α-cyclodextrin, 10-weight part of evening primrose oil containing 9 wt% of γ-linolenic acid, and 100-weight part of peptide were mixed with lactose, glucose, and natural fruit juice powder, thereby producing a tablet prepared by a conventional method.

[0032]

[Effect(s) of Invention] In the weight-reducing food of the present invention, all three items, branched α-cyclodextrin, γ-linolenic acid, and peptide with activation functionality, are contained. By the synergic action among the three compounds, a remarkably excellent obesity and body weight gain preventing effect is obtained. Thus, the food is an excellent product for weight reduction, which is very effective for the prevention of various diseases derived from obesity or excessive body weight.